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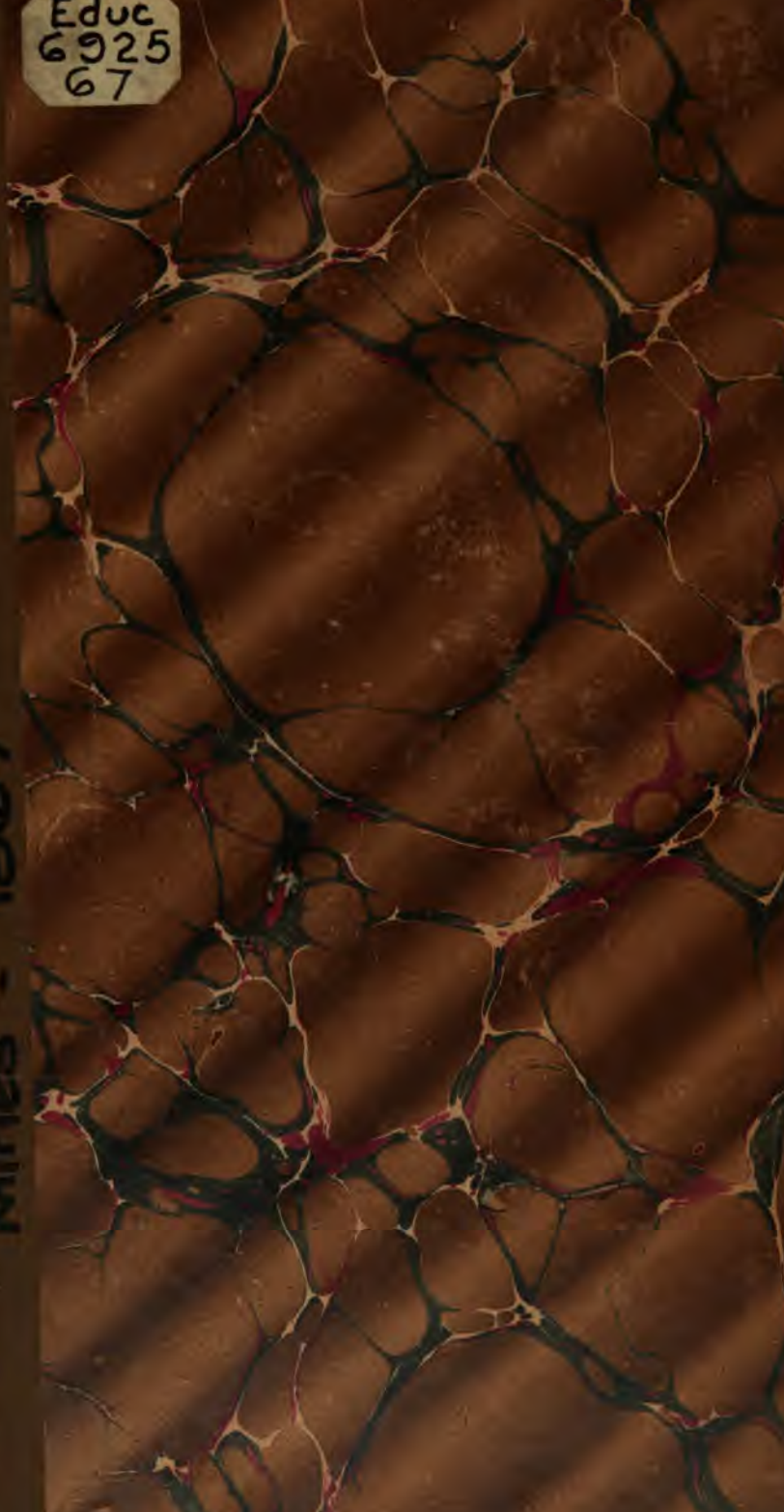
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Considerations on a National School of
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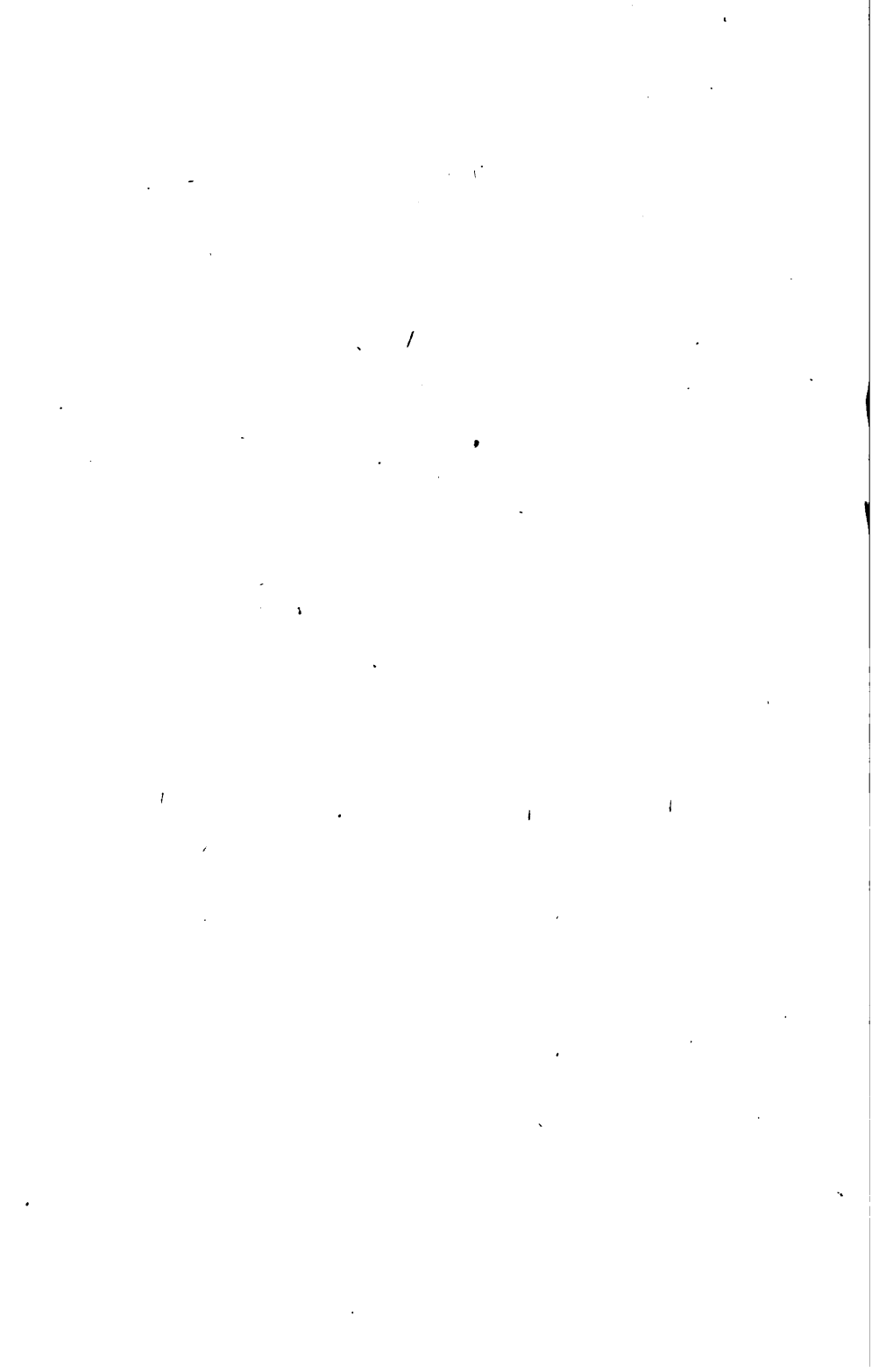
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CONSIDERATIONS

With Comments of

J. Ross Browne

REFERENCE TO THE ESTABLISHMENT

OF

A NATIONAL SCHOOL OF MINES

AS

A MEANS OF INCREASING THE PRODUCT

OF

GOLD AND SILVER BULLION.



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If to the ingenuity of the New World, the thoroughness, the patience, and the science of the Old could be added, far greater results might be expected than those we now attain.—NORTH AMERICAN REVIEW.

It is a consolation to observe that under every zone the cultivation of science and art establishes a certain equality among men, and obliterates, for a time at least, all those petty passions of which the effects are so prejudicial to social happiness.—BARON HUMBOLDT.

A NATIONAL SCHOOL OF MINES.

At no period in our history has there existed a greater necessity for an increase in the production of bullion than at present. The ablest intellects of the country have been for some time past directed to the subject of our financial condition. Already numerous schemes have been presented to Congress for the maintenance of our credit at home and abroad, and various projects having in view a reduction of the burden of taxation will doubtless be discussed during the present session. Considering the great importance of the mining interest in this connection, it seems singular that the annual decrease in our product of bullion for the last few years has attracted so little attention. According to a statement in the President's message, "the production of precious metals in the United States from 1849 to 1857, inclusive, amount to \$579,000,000; from 1858 to 1860, inclusive, to \$137,500,000; and from 1861 to 1867, inclusive, to \$457,500,000—making the grand aggregate of products since 1849, \$1,174,000,000." This estimate certainly does not exceed the amount actually produced. But the returns of the principal mining States and Territories will show that for several years past there has been a gradual decline.

Thus California produced in 1853 as high as \$57,330,030, as shown by the manifest of bullion export from San Francisco. The actual production for that year probably exceeded \$60,000,000. In 1865 the yield was \$30,986,530; in 1866, \$26,500,000; and in 1867, as estimated, \$25,000,000. Nevada, a silver producing State, has increased somewhat during the past three years, but all the other mining States and Territories have fallen off. The best authorities estimate the yield of Montana as follows: 1862, \$500,000; 1863, \$8,000,000; 1864, \$13,000,000; 1865, \$14,500,000, 1866, \$16,500,000; 1867, \$12,000,000. The maximum estimate for Colorado in 1863 was \$9,000,000; in 1864, \$6,000,000; in 1865, \$4,500,000; in 1866, less than \$3,000,000; and the probable yield for 1867 will not exceed \$2,500,000. The product of Idaho for 1866 is estimated by good authorities at \$10,000,000. This year (1867) it will scarcely reach \$6,000,000. Arizona now produces comparatively nothing. Notwithstanding these discouraging facts, so far from any diminution in the source of supply, recent explorations have developed the fact that our great mineral belts extend over a much larger area than was ever before supposed. The supply, in short, is inexhaustible. As yet it has scarcely been tapped. Why, then, should our

annual product be on the decline? Because, in the first place, the surface diggings can never be relied upon as a permanent source of supply, and they very soon yield their maximum; and in the next, vein or quartz mining is of slow development, and requires capital and skill. A late number of the *New York World* contains an article bearing directly upon this subject, and indicating the true cause of the decline in the bullion product of the country. We quote it for the information it contains:

In a recent article on the subject of an American Polytechnic School, we briefly referred to the growing importance of our mineral resources, and the peculiar necessity at this time for a great central school of mines on the Pacific coast. The estimated loss of \$15,000,000 on the reduction of ores produced from the mines during the present year does not, as we understand from Mr. J. Ross Browne, the Commissioner of Mining Statistics, comprise by any means the entire loss to which this great national interest is subject. Assuming our total yield for 1867 to be, in round numbers, \$75,000,000, and the average loss arising from imperfect systems of reduction to be twenty-five per cent., we have a total loss on gold and silver combined of \$25,000,000. Mr. Browne's arguments is, that by the judicious application of science to the business of mining, and especially to the treatment of the ores, at least \$15,000,000 of this amount might be saved. But this statement of loss is confined to ores actually taken out of the ground and worked. No account is taken of the vast quantity of ore cast aside as too poor to justify the expense of working under the present costly methods, or of the innumerable mineral lodes now practically valueless, which, in any country possessing first-class mining schools, would be inexhaustible sources of wealth. Nor does the estimate embrace the immense losses to which miners are subject from the erection of unsuitable machinery and from ignorance of the chemical composition of the ores and the process of reduction applicable to each class. The same ores are worked by different systems in mills located within a stone's throw of each other, and yet no record is kept of the depth from which they are taken, what the yield is by one system as compared with another, or under what combination of circumstances the best results are obtained. On the Comstock lode 500 tons of ore, it is said, are worked daily with the aid of blue vitriol and salt, at an expense for these two articles alone of \$118,800 per annum. Some mills use double as much on the same kind and quantity of ore as others. Who can tell the result? Both cannot be right, and yet the mine and mill owners have a direct pecuniary interest in knowing why and to what end these things are done. One mill expends \$17,000 for blue vitriol on 36,000 tons of ore, and \$35,000 on quicksilver. The loss of quicksilver, as stated by experts, is due in great part to the use of blue vitriol. Who is prepared to say whether the gain in silver justifies the expense? No test has been made, and no account complete in its details shows that this loss is necessary or justifiable. The Hale & Norcross mine, one of the best managed on the Comstock lode, had a lot of 15,639 tons of ore worked at fourteen different mills during a portion of the past and present year, the assay value of which, according to their books, was \$465,190 in gold; \$822,942, silver; total, \$1,288,132; amount produced, \$397,157, gold; \$419,819, silver—total, omitting fractions, \$816,975—loss, \$471,155. This is a favorable example of the work done on the Comstock lode. Not more than sixty five per cent. is saved on an average of all the ores worked. The latest returns from San Francisco indicate a yield this year of \$17,000,000. A loss of thirty-five per cent. would be considerably over \$9,000,000. This is remarkable on a

single lode. No nation on earth can furnish such an example of extravagance. The percentage of loss on gold throughout the Pacific States and Territories is not so great as on silver; but it is quite sufficient to merit the most serious consideration.

The experts engaged in our mines are nearly all foreigners; we send our young men to the schools of Freiburg, Berlin, Paris, Schemnitz, and elsewhere in Europe, to learn that which they could much better learn at home, if we had institutions equally thorough and comprehensive. And why should we not have such institutions? Our mineral resources are of far greater magnitude and value than those of any other country. Are we, a progressive people in all other respects, to lack in this? Whilst we are losing 35 per cent. of the product of our richest mineral lode by inefficient systems of working, the entire loss in amalgamation, according to Inspector Winkler, in the treatment of the Freiburg ores—which are far poorer and more rebellious than those of the Comstock—ranges from 5 to 9 per cent. Allowing for the difference in the cost of labor and material, and for the high rates of interest on capital in our country, this shows a remarkable contrast between the results of misdirected energy and the judicious application of science to the practical details of mining and metallurgy.

Mr. Brown Browne has a scheme for the establishment of a national school of mines at some central point in the great mineral region of the West. The act of Congress of September 4, 1841, giving 500,000 acres of land to each new State upon its admission, for purposes of internal improvements and for the support of common schools, and the act of July 2, 1862, giving to the several States and Territories "which may provide colleges for the benefit of agriculture and the mechanic arts," the proportion of 30,000 acres of public land to each Senator and Representative, according to the census of 1860, are practicably inapplicable to the establishment of a school having for its special object the application of science to the art of mining. Approving Mr. Browne's ends, we reject his means.

For our part, we trust that the business of mining and our schools of mines may be spared the meddling and marring of Government interference. Governments can do well their single business of ordaining and establishing justice between men. Whatever else they undertake they botch, and get power thereby, sooner or later to be misused.

The enormous progress thus far made in mining has been made without Government help. Much remains to be done. God forbid that our mines should be hindered in the doing of it by any sort of Government meddling whatever. Let it get out of debt, make a decent tariff, and let the South up first.

If we understand Mr. Browne's proposition correctly, it is not fairly stated in the concluding paragraphs of the above article. He does not propose that Government shall "interfere" or "meddle" with the business of mining, or even carry on a mining school. The enormous progress thus far made in mining, to which the *World* refers, is certainly not in the direction of metallurgy, or the concentration and reduction of ores. The Americans are perhaps the best miners in the world, so far as the mechanical art of mining is concerned, but they are no more successful now in getting the precious metals out of the ores than they were when they commenced. The common Mexican with his *arastra*, produces better results than the generality of large mills, though the process would be rather slow

for a progressive people. Of late years our "enormous progress" seems to be backward. It would be no "hindrance" to the miners to have a great national school of mines in their midst, managed by a directory of their own choice; to have free access to the best scientific aid; to be enabled to have reliable tests made of their ores, and the best methods of reducing them.* If they require no such aid from Government, they will go on as they are going now; but a few years more, at the present rate of decrease, will reduce the total bullion product of the United States to forty or fifty millions a year. There is no good reason, except that stated, why it should not be \$200,000,000, and increase annually at least twenty-five per cent. for the next twenty years. Is not this a matter of sufficient importance to be treated with candor and consideration?

In an able and elaborate speech delivered in the Senate of the United States, on the 18th of June 1866, Mr. Stewart, of Nevada, says:

"Much has been done by the inventive genius of the American people to acquire a practical knowledge of mining, and the complicated machinery necessary thereto. Millions have been expended by the miners themselves in experiments and inventions, and a laboratory of art may be found in the mining region of the west, where the students of the Old World may learn new lessons; but Americans are not yet educated in the science of mining. All the nations of Europe of any importance have well-endowed mining colleges, supported to a great extent at public expense, where thousands of young men are educated in this important branch. The few Americans who pretend to scientific knowledge of this subject have been educated in Europe. Every year young men go from the Pacific States to Freiburg, Paris, or other European cities, to learn how to mine in their own country. Hundreds of thousands of dollars are paid annually to foreigners for that scientific knowledge of mining which Americans do not possess. But our Eastern schools are beginning to realize the importance on this subject. Columbia, Yale, Harvard, and other colleges, are making laudable efforts to supply the defects; but we need mining colleges in the mining districts, where the youth of America may study the science of mining with the laboratory of nature before them as a guide, and where theory and practice may be combined. We want some means of disseminating useful information on this subject among the people at large. To this end Congress may do much."

The bill recently introduced by Mr. Stewart seems to have been prepared with a view to a more systematic development of the great mining interest of the Pacific slope. The following are its provisions:

Section 1 provides that the tax levied and collected upon gold and silver bullion be set apart, so long as the same shall be collected by the

*On the subject of National Schools of Mines, and the necessity of establishing such institutions on a liberal and comprehensive scale, see the following authorities: PROSPECTUS GOV'T. SCHOOL LONDON, 1st and 2d Session, 1852-3; INDUSTRIAL INSTRUCTION ON THE CONTINENT, by Lyon Playfair, C. B. F. R. S.; MINING ACADEMIES OF SAXONY AND HUNGARY; SCHOOL OF MINES, Paris, *Compte-Rendu de Travaux des Ingenieurs des Mines*. *Annales des Mines*, Vol. 1, *Memoirs Geographical Survey of Great Britain*; TITLES TO MINING CLAIMS, California, Gregory Gale, p. 320; NORTH AMERICAN REVIEW, October Art. National Schools of Science; TAYLOR'S HUMBOLDT, Mexican Mines and Mining College; SIR DAVID BREWSTER: Address before British Association, Edinburgh, July, 1850; IMPORTANCE OF SCIENTIFIC KNOWLEDGE; EDWARD EVERETT, *Orations and Speeches*, Vol. 1; POPULAR LECTURES ON GEOLOGY, R. C. Van Leeuwen, Professor at the University of Heidelberg, &c., &c.

Government, as a special fund for the endowment and support of a school of mines, to be located on the line of the Pacific railroad, west of the Rocky Mountains, as near as practicable to the centre of the mining States and Territories.

SEC. 2. That each State and Territory located, in whole or in part, west of the eastern base of the Rocky Mountains may appoint one member of a board of directors, a majority of whom shall constitute a quorum; and in case of failure on the part of any State or Territory so to appoint, the President shall appoint such member, by and with the advice and consent of the Senate; but no part of the fund herein provided for shall be expended in salaries, travelling, or other personal expenses of the said board of directors.

SEC. 3. That the said board of directors shall have power to make rules and regulations for the organization and government of the school, shall appoint its professors, teachers, and officers, and exercise supervision and control over the fund herein appropriated.

SEC. 4. That no professor, teacher, or other officer of this institution shall be removed except upon charges and specifications duly investigated by the board of directors, and the decision of the Secretary of the Treasury, to whom the facts and the evidence shall be reported, shall be conclusive.

SEC. 5. That tuition in this institution shall be free to any citizen of the United States who may present proper evidences of qualification, to be determined by the faculty; and it shall also be free to students from other countries, duly recommended by the authorities of the schools in which they shall have become qualified; but all expenses for books and stationery, and all personal expenses for lodging, subsistence, and travelling, shall be borne by the students themselves.

SEC. 6. The primary object of the school being an increase of the bullion product of the country, by the practical application of science to mining, and the diffusion of correct knowledge among miners as to the best methods of treating the ores, no charge shall be made for essays, test, metallurgical or other experiments, except to cover the actual cost of material used.

SEC. 7. That the Secretary of the Treasury, on and after the first day of July, eighteen hundred and sixty-eight, shall set apart the fund hereby appropriated for the purpose named in this act; and he shall, after receiving a report from the Board of Directors, locate the school and furnish plans and specifications for all necessary buildings and improvements, which shall be plain and substantial, and upon the most economical plan consistent with the purposes of the institution.

SEC. 8. That in order that the Board of Directors may be placed in possession of the most approved systems of education, the Secretary of the Treasury shall cause an examination to be made of the principal mining schools of Europe, and a report to be prepared upon the same, the expense of such service to be paid out of the unexpended balance of the appropriation heretofore made for the collection of mining statistics.

SEC. 9. That the duties now performed by the special commissioner appointed by the Secretary of the Treasury to collect mining statistics in the States and Territories west of the Rocky Mountains shall, upon the organization and completion of the school mines created by this act, be performed under a permanent system by the faculty of said institution, and their report shall be transmitted annually to the Secretary of the Treasury, to be by him laid before Congress.

SEC. 10. That the professors and teachers under the direction of the president of the institution, shall make annual visits to the principal

mining districts, accompanied by their respective classes, for the purpose of examining the mines, mills, and modes of working, and instructing the pupils in the practical operations of mining and metallurgy; and the said professors and teachers shall also, as far as their time will permit, give free lectures to the miners on geology, mineralogy, metallurgy, and mining engineering, and kindred subjects.

SEC. 11. That the Secretary of the Treasury shall require from the disbursing officer or officers appointed by the Board of Directors, such bonds and vouchers as he may deem necessary for the security and proper disbursement of the fund.

SEC. 12. That from and after the expiration of the fiscal year commencing July first, eighteen hundred and sixty-eight, not exceeding one-half of the fund arising from the tax levied upon gold and silver bullion shall be expended by or on behalf of the institution, the remaining half to be set apart by the Secretary of the Treasury and invested in Government securities, which shall remain, both principal and interest, a permanent fund for the support and maintenance of the institution; and no part of the reserved half, either principal or interest, shall be drawn so long as the Government shall continue to impose a tax upon gold and silver bullion; but, after such tax shall have ceased, the interest on the reserved fund shall be used for the purpose hereinbefore mentioned.

There is no meddling or interfering with private business in this bill. A fund is appropriated, and the States and Territories most interested are to manage the institution themselves. All the miners ask is, that since they pay taxes on every branch of their business and on the material used, as well as a tax on income, the additional tax imposed upon the product of their labor shall be used to aid them in developing the mineral resources of the country. Government still owns the mines; few purchases in fee having yet been made under the mineral land law of July 28, 1866. Surely, then, Government has a right to adopt such measures as may be calculated to enhance the product of the mines. Its credit is dependent to a great extent upon the supply of bullion. Let the yield fail, and what will our currency be worth when we begin to draw upon the accumulated stock of bullion necessary to sustain the current business of the country?

Assuming the yield of our mines from 1848 to 1867, inclusive, to be as stated, \$1,174,000,000, a loss of 25 per cent. in the process of extracting that amount would be \$391,333,333, which is more than we now have in the Treasury and all the banks in the country. Suppose, by a better system of treating the ores, one-half of this amount could have been saved, there would now be an addition to our stock of precious metals of \$195,666,666. Add to this the loss in unsuitable machinery and unprofitable labor, owing to the want of scientific knowledge, and it is plain the aggregate loss resulting to the country from this cause alone, upon ores actually worked, would far exceed 25 per cent.

Mr. Louis A. Garnett, formerly melter and refiner in the United States Branch Mint, and at present manager of the San Francisco Assaying and Refining Works, says, in a printed letter to the Secretary of the Treasury,

that it costs in labor alone \$1.80 for every dollar produced from our mines. He bases this estimate upon a population of 100,000 men engaged directly in mining, at the minimum wages of \$3 per day for 300 days, and upon a product of \$50,000,000. A mining population of 50,000, engaged in actual labor in the mines at \$4 per day for 250 days, would probably be nearer the facts. This would give a result of \$50,000,000 as the cost for labor alone. Add for current expenses of management, wear and tear of machinery, material, &c., \$25,000,000, and you have a total cost, without calculating interest on capital, of \$75,000,000 to produce \$75,000,000, the maximum estimate for this year: in other words, it costs a dollar to produce a dollar. "Upon what principle of political economy," says Mr. Garnett, "a tax upon the mining interest can be justified, I confess I am unable to discover. It practically amounts to taxing a man for the privilege of working at his own expense for the public benefit." If the miners are taxed at all, it would be good policy to apply the tax in such a way as to increase the product of bullion; still better, to take the tax off altogether, and make a direct and liberal appropriation to carry out the object of Mr. Stewart's bill. But that is scarcely to be expected.

The *NEW YORK TIMES* attaches great value to a School of Mines, but does not see why the Government might not as well establish a School of Agriculture, or a School of Commerce, or a School of Commercial Navigation. There is a Bureau in the Treasury Department specially designed to promote the interests of Commerce and Navigation. The Coast Survey, the Light-House Board, the Consular System, the Board of Steam Boiler Inspectors, are all carried on at Government expense, for the benefit of Commerce and Navigation. The Bureau of Statistics is an important aid to commerce and navigation. Surely these great interests have no cause to complain. What has Government done, on any scale commensurate with these great expensive branches of the public service, to promote the interest of mining? Congress has already established a Bureau of Agriculture, and provided by donations of land for "Schools of Agriculture and the Mechanic Arts."

But no Mining School has been established by any of the States or Territories under the act of 1862. California is about to establish a State University, in which there will probably be a department for theoretical instruction in mining, as in some of the Colleges of the East, with which this donation has been consolidated. Something, of course, will be gained by such elementary instruction, but these miscellaneous institutions can never prove a substitute for a great Central Mining School, devoted exclusively to mining. As for commerce, it will take care of itself, if you give it the products of the earth to sustain it. If the *Times* can devise some means by which we can get along without the precious metals, its argument will be conclusive. But with six or seven hundred millions of

gold bonds to pay in Europe, two hundred and forty or fifty millions of gold and silver in the country to pay it with, and the product of bullion rapidly diminishing, how is it to be done? Mr. Garnett, whose experience in financial matters entitles his opinions to great weight, contends that such a drain must culminate in general financial disaster. "As gold becomes scarcer, the greater the premium; the greater the premium on gold, the lower the value of currency; the lower the value of currency, the higher prices become," &c. Neither agriculture nor commerce is to be stimulated by financial depression, and it is only by diminishing the balance of trade against us that we can hope to get over the difficulty. The agriculture, commerce, and navigation of the Pacific coast would now be carried on chiefly by Digger Indians, if it were not for the adventurous spirit of the American people and the allurements inherent in the business of mining.

The Secretary of the Treasury deems the establishment of a national mining school a matter of sufficient importance to give it favorable notice in his recent report. After detailed reference to the labors of the Special Commissioner, he says:

Under the most favorable circumstances, such a drain upon our resources as that to which attention is now called would appear to demand the serious consideration of Government. The special commissioner recommends, as the only possible remedy, the establishment at some central point west of the Rocky Mountains of a national mining school, organized upon comprehensive principles, analagous in its general design and scope to the great mining schools of Europe. By the concentration of scientific experience upon the processes of mining and metallurgy, and the analytical and working tests that could be applied to the different ores, where individual enterprise has so long and so signally failed, it is believed the results would be beneficial. Without assuming to suggest by what means this object could be best accomplished, the Secretary deems it due to the enterprising pioneers of the West, who have opened up a vast empire to settlement and civilization, that their wishes, as represented by the commissioner, should meet with the most favorable consideration. Whatever can be done to promote their welfare will be a national benefit; and none will question that the tendency of scientific institutions is to strengthen the bonds of interest and sympathy between a people separated by a diversity of pursuits and the circumstances of their geographical position.

Whatever difference of opinion may exist as to the means proposed, the Secretary's views on the subject are just and liberal, and merit the favorable consideration of Congress.

The establishment of a National School of Science was a favorite project with our first President. In an address to the Commissioners of the Federal District in 1795, he says: "It has always been a source of serious reflection and sincere regret with me, that the youth of the United States should be sent to foreign countries for the purpose of education. Although there are doubtless many under these circumstances who escape the danger of contracting principles unfavorable to republican government, yet we ought to deprecate the hazard attending ardent and susceptible minds from

being too strongly and too early prepossessed in favor of other political systems before they are capable of appreciating their own." There are now at the Mining School of Freiburg about one hundred and twenty students, of whom more than one-third are from the United States. The Governments of Great Britain, France, and other countries have found it necessary to furnish facilities beyond the scope of private schools for the practical application of science to mining. According to a late number of the London Mining Journal, the result has been a large increase in the number of dividend-paying mines. Such an increase is very much needed in our mineral regions. The dividend paying mines are few and far between.

Of the necessity of an increased product of bullion there can be no question. The ablest political economists of Europe and America are unanimous upon that point.

Sir Archibald Allison, referring to the wonderful effects of the gold discoveries in California and Australia, makes use of this emphatic language :

"That which for five and twenty years had been awaiting—a currency commensurate to the increased numbers and transactions of the civilized world—was now supplied by the beneficent hand of nature. The era of a contracted currency and consequent low prices, and general misery, interrupted by passing gleams of prosperity, was at an end. Prices rapidly rose ; wages advanced in a similar proportion ; exports and imports enormously increased, while crime and misery as rapidly diminished."

Mr. Stewart forcibly illustrates the influence of increased production of bullion in our own country :

"The increase of the precious metals serves a double purpose. A dollar in gold or silver adds as much to the wealth of the nation, is just as good an export, and will stimulate commerce and enterprise as much as the choicest products of any country. If used as an export, it costs less in transportation than any other product, and the article which it buys pays the same duty as an article purchased with cotton or wheat. But after we have compared it, and find it performing the functions of any other commodity, and with more ease and facility, we have not yet taken into the account its most beneficial agency in relieving a nation burdened with debt. Our financiers were not interested to inquire how the burdens of the nation could be lightened by large and increasing yields from the mines, but war has changed our situation, and incumbered us with three thousand millions of debt, with accumulating interest, which, before it can be paid, will reach the enormous sum of not less than six thousand millions, principal and interest, all to be paid in gold or its equivalent. Our financial circumstances are now entirely similar to those of the nations of Europe, encumbered with vast pecuniary obligations. Their experience and investigations have become subjects of living interest. While labor is the real standard of value, and the ultimate source of wealth, gold and silver are the universal measures of value, not only of the value of every other commodity, but they are the test by which every other circulating medium is estimated, thus educating the popular mind in the erroneous belief that a piece of gold of a given degree of fineness retains a fixed and permanent value."

Mr. Conness, whose ability, zeal and energy in the advocacy of great measures for the development of the material resources of the Pacific slope entitle him to the lasting gratitude of the people of that region, said, in the course of the debate on the Mineral Land bill :

"I will not undertake to extend this debate or the consideration of this question by entering into an estimate of what the production of gold costs. It would be mere guessing at best ; but I undertake to say that there is no commodity which the enterprise and commerce of our country and of the world require so much as the addition to our circulation of the precious metals. I need not waste a word in stating how it incites the trade and commerce of the country, and of the whole world."

Mr. Nye said, in the course of the same debate :

"I beg the Senate to bear in mind the fact, that every additional dollar of gold and silver that we produce, lays the foundation of our financial structure on a more stable foundation. Let it be known that we can produce gold and silver to make our credit always secure and sure, that the interest will be paid in the precious metals, and our credit will stand as high, if not higher than that of any other nation of the earth."

The importance of such an increase to the United States has been forcibly presented by the Committee on Public Lands of the House. Mr. Julian, the intelligent chairman of that committee, in a report on the mineral lands, dated June 5, 1866, says :

"In the judgment of the committee there is very great need of an increase in the *quantity* of precious metals. The disproportion of gold and silver to other values, and to our commercial wants, is very remarkable. If practicable it should be reduced. The property of the United States, within the last ten years, has increased about nine hundred million dollars per year ; and this increase is estimated to be more than two hundred times greater than the increase of coin during the same period. It is believed that some policy which will secure to the Government a fresh and liberal supply of the precious metals will be found absolutely necessary."

A policy is here presented which it is estimated will increase the annual bullion product to more than \$200,000,000 within a few years. Now is the time for intelligent action on the subject. The Pacific railroad is opening up direct and easy communication with the great interior of the continent. Our mineral resources are practically without limit. More than nine-tenths of the mines discovered and proved to be valuable are now lying dormant. The question is, will Government lend its aid to their development, or be content to ignore this great interest ? So far, individual energy has failed to accomplish the objects contemplated in Mr. Stewart's bill. Possibly the miners may be more successful hereafter than they have been for the past two or three years ; but the history of mining in other countries does not sustain that hope with reference to a more profitable treatment of the ores, or to the development of mineral lodes now unproductive, or, indeed, to any of the objects designed to be accomplished by the establishment of a National School of Mines. It is clear, then, that

unless some action is taken on the subject by our Government, past experience does not warrant us in expecting an increase of the bullion product in the future.

On the subject of the proposed School of Mines, the San Francisco Bulletin, one of the leading journals of California, says :

"The Commissioner of Mining Statistics for the Pacific Coast urges that Government should establish a National School of Mines, somewhat after the plan of those existing at Berlin, Freiburg, London, Paris, and at different points in Austria, Spain, and Mexico. A large portion of the Pacific press has advocated the establishment of a National Mining Bureau, and such a Bureau Mr. Ross Browne thinks might be of great benefit to the country, if kept clear of partisan influences and controlled by scientific and practical men, who would administer it strictly for the advantage of an important industry.

The suggestion for a Mining School is, however, a separate matter. A Mining Bureau would be a branch of an Executive Department ; a Mining School would be exclusively an educational institution, maintained at Government expense. A school of this kind, with a corps of professional experts attached, situated at some central point in California or Nevada, where the pupils could enjoy the advantage of practical experience in connection with theoretical instruction, (as at the College of Freiburg,) is believed would result in an improved system of mining. It would be to the mining interest what West Point is to the military service, and Annapolis to the naval, so far as this, that it would turn out annually a body of specially qualified men to take charge of practical mining operations, and conduct them on economical principles.

Pupils would go through a system of training in those mechanical, mineralogical, and chemical studies which are essential to intelligent and thorough mining and metallurgical process. They would study in the mines and mills the actual working of the ore, and bring to bear all the results of science derived from the experience of other countries and the best knowledge of our own. With a suitable library, an acquaintance with foreign languages, the latest intelligence from all parts of the world, assay offices and laboratories, a National Mining School would require but few years, at an inconsiderable expense, to qualify many of our young men for positions of trust and responsibility. After three years of study and observation in such a school, a young man of two or three and twenty, having the necessary elementary education and a fair capacity to begin with, would be better qualified to assume the management of a mine than most of the superintendents who are now employed on the coast. In case of fresh difficulties in the working of ore, he would have access to the school in which he graduated for advice and assistance. Government is directly interested in an increase of the mining product, for its credit and the development of resources are largely dependent upon the annual supply of bullion. It could therefore well afford the expense of a mining school, should the establishment of one be considered advisable on general grounds.

This a very brief synopsis of the arguments advanced by Mr. Browne, and we state them as a matter of public interest. His suggestion is worthy of careful consideration, and commends itself at a first glance as a very practical and valuable one. So far as our own State is concerned, we anticipate that it will some day have a local mining school in connection with a school of agriculture and mechanics, forming departments of a thorough University. But the advantages of such a local school of the practical sciences would be just as great, as part of a broad general scheme

of State education, after the establishment of a National School as before. Indeed, we can readily understand how the two might co-operate, or at least, how the State School might be made more efficient through the broader grasp of the National. There is no reason, therefore, why local prejudices or preferences should interfere to prevent a candid discussion of the Commissioner's suggestion on its merits. The subject is an interesting one, and we give it the benefit of this superficial statement in hopes of eliciting professional and practical views on both sides of the proposition.

The Mining and Scientific Press of San Francisco, a recognized authority on mining matters, says :

Within the brief space of eighteen years our people have opened up to settlement a larger area of territory, valuable as a source of supply for nearly all the necessities of man, than has ever before in the world's history been brought within the limits of civilization in so short a time. Eighteen years ago California, Arizona, Colorado, Montana, Idaho, Washington Territory, Oregon, Utah, and Nevada—occupying more than one-third of the entire area of the United States—were regions chiefly known to trappers and traders ; traversed and occupied for the most part by barbarous hordes of Indians. That this extraordinary advance, with all its concomitant results to the trade and commerce of the world, has been achieved by the discovery and development of our mineral resources, no reasonable man pretends to dispute. Every day's progress in our history speaks for itself, and the facts are patent to all.

It seems a little singular, considering the millions of treasure thus added to our national wealth, the vast range of industry opened to our people, the wonderful impulse given to agriculture, commerce, and manufactures, that of all our great national interests, the business of mining has had the hardest struggle to enlist the favorable consideration of our Government. Of late years, through the energy and ability of our Pacific delegation, and the irresistible logic of results, something has been achieved in the way of more intelligent Federal legislation.

The Mineral Land Law of July 28, 1866, granting titles in fee to the miners, is an advance in the right direction. The appropriation for the collection of mining statistics is another.

There is something to be done quite as important, in our estimation, as either ; and we are glad to know that Mr. Commissioner Browne has, after consultation with the people throughout the principal mining districts, taken the matter zealously in hand, and determined to urge upon Congress the importance of establishing a National Mining School, similar in its general features to the great mining schools of Germany, France, and England. In the preliminary consideration of the subject, it matters little about details as to the organization of the plan. There will naturally be points upon which the best judgments may differ ; but we think all will concur in the opinion that such an institution, established upon a broad and liberal basis, would be of inestimable advantage to the Pacific coast, and incidentally to every State in the Union. There is more loss to the country, even now, far as we have progressed in the science of mining, than would pay the expenses of the National Mining School ten times over. Why should we be compelled to send our young men to Freiberg to study a pursuit in which we are more deeply interested than any other people ? The State Agricultural and Mining School will be an institution of great utility, eminently worthy of encouragement. But we want something in addition to this ; something of a more national character—an institution of the highest grade ; one worthy the richest mineral

region in the world, peopled by an intelligent and progressive race, and comprising at least eight of the most promising States and Territories of the Union.

It is a well-established fact that, with all the improvements in the treatment of ores, adopted from time to time by our own miners, there is still lost in tailings and otherwise, from 25 to 30 per cent., if not more, on our annual product. It becomes, therefore, a matter of vital importance that every possible means should be taken to arrest this tremendous drain upon our resources. And the question arises, what better means can be adopted than the establishment of a great National School, in which all the resources of science and practical experience can be brought to bear upon the essential processes of concentration, reduction, and amalgamation.

The same authority, in another article, thus refers to one of the great objects that might be accomplished by such an institution:

"MINING MACHINERY—INFORMATION WANTED.—Mr. J. Ross Browne, in his first report upon mining west of the Rocky Mountains, has described the action of the various batteries and pans, used for crushing, grinding, and amalgamating; but he furnishes no data from which the miners can form any opinion as to the comparative merits of the various machines in use.* Mr. Browne could hardly do a better thing, or render a greater service to the miners, than by suggesting in his next report some means, or collecting some data by which they could form an intelligent idea as to what, out of the great multitude of machinery offered to the public, would be the best, most economical, and most effective, under any particular circumstances. As it is, the miner has nothing but the reports of interested parties, or his own usually limited experience, to guide him in his choice. This condition of things, as might reasonably be expected, often results in great pecuniary loss. Among the numerous quartz mills in operation in this State for extracting gold, there are probably not two which are operating precisely alike on the same kind of ore; yet none can say with certainty what process insures the best results under a given combination of local or general circumstances.

We have an almost infinite variety of batteries, pans, amalgamators, concentrating machines, rifles, plates, aprons, screens, etc., etc., from which to choose. A person about to build a mill, after looking around a little, (and generally to very little purpose,) guesses at some plan he has seen, and then proceeds to construct his mill. If he don't change his mind three or four times, at the suggestion of friends, before he has his mill completed, it is because he is possessed of more firmness and decision than falls to the lot of a large portion of our most intelligent miners and millmen.

Such results are inevitable from our loose and uncertain manner of working. If private individuals cannot be induced to undertake it, Government might do well to establish, as a branch of the proposed National School of Mines, an experimental mill or metallurgical department, where every new machine, as it comes out, might be tried, at the inventor's expense. The advantage to the Government, in an enhanced bullion product, and in the increase of internal revenue receipts in this State alone, would pay for such an establishment every year; while the annual saving to the public in the cost of worthless machinery, time, etc., could scarcely be estimated.

*It would be invidious, if not impracticable, for any agent of the Government to furnish such data as that. To be of any avail it must be done under an organized system; and the results must be determined by scientific and practical tests.

We throw out these hints to the collector of mining statistics, and would furthermore suggest that he could in no way more effectually subserve the purpose of his appointment than by maturing some plan whereby the benefits hinted at may be practically attained, and presenting it for the consideration of the Government. Coming from him, it would secure to such suggestions a hearing and consideration which they could scarcely attain if presented from any other source.

In reference to Mr. Stewart's bill, Professor Raymond, editor of the *American Journal of Mining*, an eminent scientific authority, says:

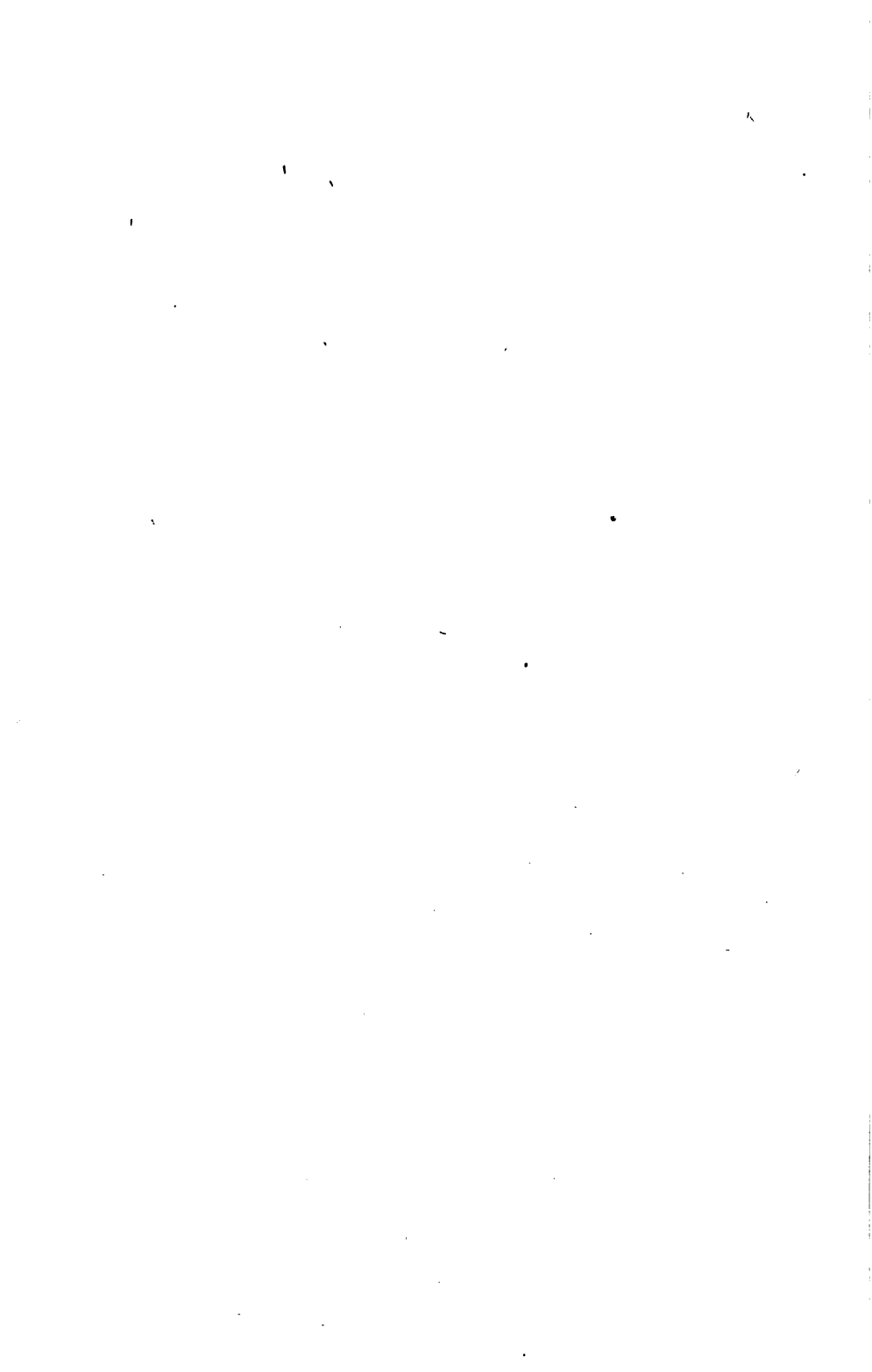
"The first bill introduced after the beginning of the second session of the fortieth Congress, was offered in the Senate by Mr. Stewart, of Nevada. The bill provides for the establishment of a National School of Mines, to be located somewhere on the line of the Pacific Railroad, and supported from the proceeds of the United States tax on bullion. This is a move in the right direction; but the bill is not very explicit as to the plan of the school, its objects, its organization, or its government. Probably it is better to leave these details to competent professional men, than to undertake to settle them in a deliberative body like Congress. It remains true, however, that such a school will be just what its managers are able and willing to make it. Mere money will not do the work. Under capable guidance, an institution of that nature would be a lasting benefit to the country. This sort of government interference with mining enterprise is calculated to injure no one, to offend no one, and to benefit all. We hope it may be so arranged as to be free from partisan political influences, independent of all Congressional or departmental control, except as to its organic laws, and supported by the best talent and experience of the country. Let us have more light on the details of the plan; and we shall know how far to lend it that hearty support which we feel inclined to give.—*Am. Journal of Mining*.

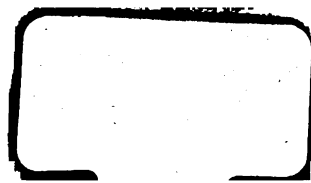
It would be impolitic, as well as practically useless, to enter into details in a legislative act of this kind. If the general design is worthy of approval, let the organization be left to those most directly interested and best qualified to carry it into effect. So far as the *object* is concerned, it is stated with sufficient distinctness in the bill. Anything more on that point would be mere verbiage.

What is the object of the great National Schools of Mines of London and Paris, of Freiburg, of Berlin, of Schemnitz, of such institutions in any country interested in mining? Everybody is supposed to understand, in a general way, the object of a great central school of mines liberally endowed by Government. To bring into the discussion details upon which the best friends of the measure might reasonably be expected to differ, would be to furnish material for endless and unprofitable dispute. No useful purpose can be subserved by encumbering a simple proposition with complicated restrictions. Experience in the practical working of any system that might be devised, would, after all, suggest the most effectual means of arriving at perfection. Undoubtedly men possessing the proper professional knowledge will have to organize the details; but experience has not demonstrated that scientific men, as a class, are more progressive,

more liberal and enlightened in matters of public policy, more exempt from petty jealousies, or possessed of greater administrative capacity than the generality of mankind. It is quite as necessary to guard against professional narrowness and discord in the management of an institution of this kind as against partisan political influences, or official incompetency. To suit the progressive spirit of a mining population, such an establishment must possess some elements of popularity, and be controlled, as far as practicable, by a Directory who can be held immediately responsible for their acts. The 4th section of the bill makes ample provision against the fluctuating influences of party, or undue interference on the part of Government. The substance of the proposition is, that the miners, who have labored so long and with so little profit to themselves to develop a great interest peculiarly national, shall, after having arrived at a point where individual energy is of no farther avail, be allowed to apply the tax now imposed upon the product of their toil to the concentration of scientific skill upon the development of the mines, and to the necessary metallurgical and chemical tests by which alone the business of mining can be made profitable to those engaged in it, and advantageous to the Government and the country.







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